

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

WELL DECOMMISSIONING

CODE 351
(Reported by No.)

DEFINITION

The sealing and permanent closure of a water well no longer in use.

PURPOSES

This practice serves to:

- Prevent entry of animals, debris, or other foreign substances into the well or well bore hole;
- Eliminate the physical hazard of an open hole to people, animals, and farm machinery;
- Prevent entry of contaminated surface water into well and migration of contaminants into unsaturated (vadose) zone or saturated zone;
- Prevent the commingling of chemically or physically different ground waters between separate water bearing zones.
- Eliminate possibility of well being used for any other purpose;
- Conserve yield and hydrostatic head of aquifers;
- Restore, as far as feasible, hydrogeologic

conditions that existed before well was constructed.

**CONDITIONS WHERE PRACTICE
APPLIES**

This practice applies to any drilled, dug, driven, bored, or otherwise constructed vertical water well determined to have no further beneficial use.

This practice does not apply to water wells that were used for waste disposal, or if evidence of contamination still exists. This practice does not apply to wells that contain contaminant levels that exceed state or federal water quality standards. Treatment of contamination source(s) is required before a well is decommissioned.

CONSIDERATIONS

This practice may be part of a ground water protection system that includes water and chemical management practices.

To the extent practicable, an abandoned well should be decommissioned in a manner that restores the original hydrogeologic conditions of the well site and does not preclude the use of the site from future land management practices.

All decommissioning procedures and fill and sealing materials need to be selected with due consideration of the site-specific geological, biological, physical and climatic conditions, the chemical composition of the surrounding soil, rock and ground water at the well site, and the well's construction practices.

If allowed by state regulations, fill materials, such as sand, pea gravel, sand-gravel mix, crushed stone, or agricultural lime can be used to plug the well provided that zones of sealing material conform to ASTM D5299, part 6.3).

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Follow NRCS state policy for considering cultural resources during planning.

CRITERIA

Criteria Applicable to All Purposes:

Criteria for all purposes shall conform to decommissioning procedures presented in ASTM D5299, Standard Guide for Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and other Devices for Environmental Activities.

Disinfection shall conform to procedures explained in Ground Water and Wells (Driscoll, 1986, pp. 620-623).

Closure options shall be compatible with all applicable federal, state, and local requirements.

Data Collection. As-built construction documents, maintenance records and other available data for the abandoned water well shall be collected, reviewed and applied toward the development of a well decommissioning plan. Existing conditions of the well shall be documented as defined in the "Plans and Specifications" section.

Well Preparation. The well shall be cleared of all pumping equipment, valves, pipelines, casings, liners, screens, grease, oil, scum, debris, and other foreign material as explained in ASTM D5299, part 7.3.8.

Disinfection. Before sealing, the entire column of well water shall be brought to an available chlorine concentration of 50 ppm or greater, or other solution specified by local or state requirements. After being agitated in the well water, the chemical solution shall be left for no less than 24 hours to assure complete disinfection.

Sealing Materials. Properties of sealing materials shall conform to characteristics listed in ASTM D5299, part 6.3. Acceptable sealing materials are provided in ASTM D5299, part 6.4. Sealing materials do not require disinfection.

Water to be mixed with grout shall be compatible with the grouting material, and shall

be of a quality that conforms to criteria provided in ASTM D5299, part 7.3.3.

Fill Material. Fill material shall be clean and free of organic or other foreign matter. The gradation shall be such that bridging will not occur during placement.

Placement of Materials. Fill materials shall be placed into the well only after the well water has been disinfected. Fill material is placed at a minimum thickness of one foot starting at the top of the lowest water bearing zone and successively placed at intervals every 10 feet or less throughout the entire well column. All material shall be placed from the bottom of the well upward by methods that avoid segregation, dilution, or bridging of the material.

For wells greater than 30 inches in diameter, backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidence.

Removal of Well Casing. If possible, the casing shall be completely removed from the well by either pulling or overdrilling (overreaming) as explained in ASTM D5299, part 7.3.1. Casing that cannot be removed completely shall be ripped, perforated, or cut off at a depth greater than the maximum potential for frost penetration or any other near surface soil fracturing hazard (such as desiccation), or three feet, whichever is greater.

Casings Grouted in Place. Casings to be grouted in place shall employ a pressurized grouting procedure that will completely fill and seal the open space around the casing.

Perforated or ripped casing shall provide sufficient apportioned open area to assure passage of the grout into the space. The casing shall be perforated or ripped throughout the entire length of a confining layer.

Casings to be removed from a collapsing formation shall be grouted concurrently with removal such that the bottom of the casing remains submerged in the grout.

Surface Seal. The interval between the ground surface and the top of cut off casing shall be sealed with sealing materials that conform to

ASTM D5299, part 6.3. These materials may be an extension of the sealing materials used below this depth.

The interval between the ground surface and the top of the cut-off casing shall be filled with soil materials that achieve an in-place hydraulic conductivity equivalent to or less than the surface soil surrounding the well. The ground surface at the sealed well site shall be mounded and graded in a manner that prevents ponding of surface runoff.

Control of Elevated Formation Pressure. If a well penetrates a formation that is under artesian head (confined conditions), or from which a gas is being released under pressure, the grout pressure must be maintained greater than the formation pressure until initial grout set occurs. Procedures for balancing formation pressures during grouting operations shall conform to ASTM D5299, part 7.3.7.

SPECIFICATIONS

Plans and specifications for this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail to ensure successful implementation of this practice. Documentation shall be in accordance with the section “Supporting Data and Documentation” in this standard.

OPERATION AND MAINTENANCE

The practice site shall be inspected periodically to ensure that the decommissioned well and the adjacent area have not settled or eroded, or are otherwise adversely disturbed. The well site and adjacent ground surfaces shall be maintained in a manner that prevents ponding of surface runoff on the site.

SUPPORTING DATA FOR DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Location the practice on the conservation map.

2. Assistance notes. The notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom.

Field Data and Survey Notes

The following is a list of the minimum data needed:

1. Plan view sketch.
2. Name of the landowner.
3. Location of the well by latitude and longitude or state coordinates.
4. Inside diameter of well bore or casing.
5. Total depth of the well.
6. Length of casing.
7. Casing material type or schedule (e.g. standard weight steel, or PVC sch-80).
8. Static water level measured from the ground surface.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field Handbook – Part 650. The following is a list of the minimum required design data:

1. Location of the decommissioned well by latitude and longitude, or other georeference convention, of such precision that it can be readily located in the field in the future.
2. Detailed plans for the well decommissioning, with the type of materials used for filling and sealing, quantities used, and depth intervals for placement of each type, and emplacement method to be used.
3. Length of casing to be removed or length to be cut off below ground level.
4. Plan view sketch, and final grading plan as required.

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| <ul style="list-style-type: none">5. Seeding, fertilizing, and mulching requirements.6. Include the Miss Utility notification statement.7. Show job class on the plan.8. Special safety requirements.9. Quantities estimate.10. Written Operations and Maintenance Plan. | <ul style="list-style-type: none">used and their depth intervals, and the emplacement method used.3. Final quantities and documentation for quantity changes. Materials certifications as appropriate.4. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards. |
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Utilities Notification

- 1. Forms ENG-5 and ENG-6 can be used to assist in tracking utility notifications.
- 2. Document on CPA-6 initial discussion about his or her responsibility to notify Miss Utility.
- 3. Document on CPA-6 any information from the landowner about the existence and location of known utilities.
- 4. Document on CPA-6 assurances from the landowner that Miss Utility has been notified, including staking by the utilities.

In addition, the as-built drawings shall include name, title, and address of the person responsible for well decommissioning and the date of the decommissioning. The as-built records shall also include any applicable "Statement of Conformance" presented or certified by the suppliers. The design folder, as-built drawings, certifications and specifications shall be filed in the case file.

Construction Check Data/As-Built Plans

Record on survey notepaper, NRCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted in red on the as-built plans. Document approval by the designer of any changes from the drawings or specifications before implementation of the change.

The following is a list of minimum data needed for as-built documentation:

- 1. Documentation of site visits on CPA-6. The documentation shall include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed and decisions made and by whom.
- 2. Check notes recorded during or after completion of decommissioning giving the date of well decommissioning, the information regarding the length of casing removed, the sealing materials and quantities